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ATTORNEY DOCKET NO. 10020666-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Daniel A. Usikov

Serial No.: 10/684,000

Examiner: J. Patel

Filing Date: October 10, 2003

Group Art Unit: 2624

Title: TOMOGRAPHIC SYSTEM AND METHOD FOR ITERATIVELY PROCESSING TWO-DIMENSIONAL IMAGE DATA FOR RECONSTRUCTING THREE-DIMENSIONAL IMAGE DATA

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) **\$500.00**.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)(1)-(5)) for the total number of months checked below:

- | | | |
|--------------------------|--------------|-----------|
| ☐ | one month | \$ 120.00 |
| ☐ | two months | \$ 450.00 |
| ☐ | three months | \$1020.00 |
| ☐ | four months | \$1590.00 |

☐ The extension fee has already been filled in this application.

☒ (b) Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account **50-1078** the sum of \$500.00. At any time during the pendency of this application, please charge any fees required or credit any overpayment to Deposit Account **50-1078** pursuant to 37 CFR 1.25.

A duplicate copy of this transmittal letter is enclosed.

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the U.S. Postal Service as Express Mail, Airbill No. EV629238138US, on the date shown below in an envelope addressed to: MS Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Dated: August 8, 2007

Signature: Donna Forbit

(Donna Forbit)

Respectfully submitted,

Daniel A. Usikov

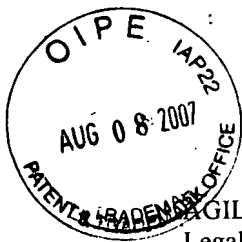
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Docket No.: 10020666-1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Daniel A. Usikov

Application No.: 10/684,000

Confirmation No.: 3446

Filed: October 10, 2003

Art Unit: 2624

For: TOMOGRAPHIC SYSTEM AND METHOD
FOR ITERATIVELY PROCESSING TWO -
DIMENSIONAL IMAGE DATA FOR
RECONSTRUCTING THREE-DIMENSIONAL
IMAGE DATA

Examiner: J. Patel

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

As required under § 41.37(a), this brief is filed within two months of the Notice of Appeal filed in this case herewith, and is in furtherance of said Notice of Appeal.

The fees required under § 41.20(b)(2) are dealt with in the accompanying
TRANSMITTAL OF APPEAL BRIEF.

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This brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1205.2:

- I. Real Party In Interest
- II Related Appeals and Interferences
- III. Status of Claims
- IV. Status of Amendments
- V. Summary of Claimed Subject Matter
- VI. Grounds of Rejection to be Reviewed on Appeal
- VII. Argument
- VIII. Claims Appendix
- IX. Evidence Appendix
- X. Related Proceedings Appendix

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is:

Agilent Technologies, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 19 claims pending in application.

B. Current Status of Claims

1. Claims canceled: 11
2. Claims withdrawn from consideration but not canceled: None
3. Claims pending: 1-10 and 12-20
4. Claims allowed: None
5. Claims rejected: 1-10 and 12-20

C. Claims On Appeal

The claims on appeal are claims 1-10 and 12-20.

IV. STATUS OF AMENDMENTS

A Final Office Action rejecting the claims of the present application was mailed June 8, 2007. In response, Applicant did not file an Amendment After Final Rejection, but instead files a Notice of Appeal, which this brief supports. Accordingly, the claims on appeal are those as rejected in the Final Office Action of June 8, 2007. A complete listing of the claims is provided in the Claims Appendix hereto.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The following provides a concise explanation of the subject matter defined in each of the separately argued claims involved in the appeal, referring to the specification by page and line number and to the drawings by reference characters, as required by 37 C.F.R. § 41.37(c)(1)(v). Each element of the claims is identified by a corresponding reference to the specification and drawings where applicable. It should be noted that the citation to passages in the specification and drawings for each claim element does not imply that the limitations from the specification and drawings should be read into the corresponding claim element.

According to one claimed embodiment, such as that of independent claim 1, a method for processing 2D image data for reconstructing 3D image data therefrom is provided. *See e.g.*, paragraphs 0019, 0043-0053, 0055, and 0058 of the specification. The method comprises receiving a plurality of 2D images (e.g., 2D image data of FIG. 14) acquired at different angles of view. The method further comprises iteratively processing the received 2D images to reconstruct 3D image data therefrom (e.g., 3D image data reconstructed by reconstruction processor 1403 and stored to data storage 1404 in FIG. 14).

In certain embodiments, such as that of dependent claim 4, the 2D images are not required to be received in a pre-defined order. *See e.g.*, paragraphs 0051-0052 of the specification.

In certain embodiments, such as that of dependent claim 5, the iteratively processing comprises processing said 2D images as they are received. *See e.g.*, paragraphs 0051-0052 of the specification.

In certain embodiments, such as that of dependent claim 6, the iteratively processing comprises processing 2D images in the order in which they are received. *See e.g.*, paragraphs 0051-0052 of the specification.

According to another claimed embodiment, such as that of independent claim 15, a system for processing 2D image data for reconstructing 3D image data therefrom is provided. *See e.g.*, paragraphs 0020, 0043-0053, 0055, and 0058 of the specification. The system comprises means (e.g., reconstruction processor 1403 of FIG. 14) for receiving a plurality of 2D images (e.g., 2D image data of FIG. 14) acquired at different angles of view. The system further comprises means (e.g., reconstruction processor 1403 of FIG. 14) for iteratively processing the received 2D images to reconstruct 3D image data therefrom (e.g., 3D image data reconstructed by reconstruction processor 1403 and stored to data storage 1404 in FIG. 14).

In certain embodiments, such as that of dependent claim 17, the means for iteratively processing does not require that the received 2D images be received in a pre-defined order. *See e.g.*, paragraphs 0051-0052 of the specification.

According to another claimed embodiment, such as that of independent claim 18, a system for processing 2D image data for reconstructing 3D image data therefrom is provided. *See e.g.*, paragraphs 0021, 0043-0053, 0055, and 0058 of the specification. The system comprises an imaging system (e.g., imaging system of FIG. 1 and/or imaging system 1402 of FIG. 14) operable to capture a plurality of 2D images (e.g., 2D image data of FIG. 14) at different angles of view. The system further comprises a reconstruction processor (e.g., reconstruction processor 1403 of FIG. 14) communicatively coupled to the imaging system, said reconstruction processor operable to receive the plurality of captured 2D images and iteratively process the received 2D images to reconstruct 3D image data therefrom (e.g., 3D image data reconstructed by reconstruction processor 1403 and stored to data storage 1404 in FIG. 14) in accordance with a conjugate gradient algorithm.

In certain embodiments, such as that of dependent claim 19, the reconstruction processor does not require the 2D images to be received in a pre-defined order. *See e.g.*, paragraphs 0051-0052 of the specification.

In certain embodiments, such as that of dependent claim 20, the reconstruction processor does not require a pre-defined order of capturing said different angles of view. *See e.g.*, paragraphs 0051-0052 of the specification.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-6 and 13-20 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,442,674 to Picard (hereinafter “*Picard*”);

Claims 7-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over *Picard* in view of an article published by Elena Loli and Fabiana Zama (hereinafter “*Elena*”); and

Claim 12 is rejected under 35 U.S.C. §103(a) as being unpatentable over *Picard* in view of *Elena* and further in view of U.S. Patent No. 5,053,958 to Tam (hereinafter “*Tam*”).

VII. ARGUMENT

Appellant respectfully traverses the outstanding rejections of the pending claims, and requests that the Board reverse the outstanding rejections in light of the remarks contained herein. The claims do not stand or fall together. Instead, Appellant presents separate arguments for various independent and dependent claims. Each of these arguments is separately argued below and presented with separate headings and sub-heading as required by 37 C.F.R. § 41.37(c)(1)(vii).

I. Rejections Under 35 U.S.C. §102 over *Picard*

Claims 1-6 and 13-20 are rejected under 35 U.S.C. §102(b) as being anticipated by *Picard*. To anticipate a claim under 35 U.S.C. § 102, a single reference must teach every element of the claim, *see* M.P.E.P. § 2131. Appellant respectfully traverses this rejection because *Picard* fails to teach all elements of claims 1-6 and 13-20, as discussed below.

Independent Claim 1 and Dependent Claims 2-3 and 13-14

Independent claim 1 recites:

A method for processing 2D image data for reconstructing 3D image data therefrom, the method comprising:
receiving a plurality of 2D images acquired at different angles of view;
and
iteratively processing the received 2D images to reconstruct 3D image data therefrom. (Emphasis added).

Picard fails to teach iteratively processing received 2D images to reconstruct 3D image data therefrom. Instead, *Picard* is directed to calibrating an X-ray imaging device, in which *Picard* appears to teach iteratively processing 2D images to automatically determine parameters or calibration coefficients of the X-ray imaging device. While *Picard* mentions that its X-ray imaging device may be a device that captures 2D radiographic images at various different angles of incidence so that the captured 2D radiographic images may then be used to reconstruct 3D information, *Picard* does not address the reconstruction techniques that are employed for performing such reconstruction of 3D information from the captured 2D radiographic images.

Picard certainly fails to teach iterative processing of the 2D images to reconstruct 3D image data. Instead, *Picard* is primarily focused on calibrating its X-ray imaging device that captures 2D images, and *Picard* appears to propose an iterative technique (using the conjugate gradient) for analysis of 2D images obtained for a calibration object (that comprises beads arranged it) to estimate parameters of the X-ray imaging device in order to automatically calibrate such device.

Picard provides at col. 1, lines 9-11 that its “invention relates to a device and to an automatic method for the geometrical calibration of an X-ray imaging system.” “The invention relates essentially to systems using 2D radiation detectors”. Col. 1, lines 17-19 of *Picard*. “The term ‘geometrical calibration of an imaging system’ denotes the operation that leads to precise indirect knowledge of the geometrical parameters that play a role in the production of an image.” Col. 2, lines 3-6 of *Picard*. Such calibration may be performed by capturing 2D images of a calibration object (or “calibration phantom”) and then manually analyzing such images by a human operator to adjust calibration parameters of the imaging system accordingly, *see* Col. 2, line 3 – col. 3, line 7 of *Picard*.

Picard explains that such manual intervention is a “major drawback”, particularly when the system is being calibrated for a variety of different viewpoints, as is used in capturing 2D images that are then intended to be processed to reconstruct 3D images, *see* col. 2, line 62 – col. 3, line 7 of *Picard*. Therefore, *Picard* proposes a system in which a calibration object has a known arrangement of beads therein, wherein 2D images of such calibration object are processed to automatically determine appropriate calibrated parameters of the X-ray imaging device, *see* col. 3, lines 23-38; col. 5, lines 16-46; and col. 9, lines 5-49 of *Picard*.

While *Picard* mentions that its iterative, automatic calibration technique for calibrating an X-ray imaging device that captures 2D images may be employed for calibrating such an X-ray imaging device that is used for capturing sufficient number of different viewpoints/angles of a device to enable the 2D images to be processed for 3D image reconstruction, *Picard* does not propose an iterative technique for reconstructing the 3D images from the 2D images; but instead, *Picard*’s iterative technique is directed solely to calibrating the X-ray imaging device for capturing the 2D images.

For instance, at col. 7, line 20 – col. 9, line 4 *Picard* describes “the sequence of the operations to be carried out in order to calibrate the system” (col. 7, lines 20-22). *Picard* concludes that it is “possible to estimate the parameters or calibration coefficients associated with the viewpoint, i.e. with the rotational position, that is to be calibrated, by choosing the parameters that minimize a reprojection error criterion for all the beads detected.” Col. 8, line 67 – col. 9, line 4. At col. 9, lines 5-50, *Picard* explains that its “proposed parameter estimation algorithm uses the conjugate gradient minimization technique applied to the mean square error criterion”. Thus, *Picard* employs the iterative conjugate gradient algorithm in selecting parameters for calibrating its image capture device based on known arrangements of beads that included in a calibration object being imaged.

At col. 9, lines 50-61, *Picard* mentions that a “3D reconstruction machine” is a “machine that carries out radiographies of an object at different angles of incidence obtained by rotation about an axis” where the “radiographies are then used to reconstruct 3D information.” Thus, *Picard* mentions that its imaging device being calibrated may capture 2D images that are to be used for reconstructing 3D information therefrom. *Picard* goes on to describe that rather than computing the calibration coefficients for each viewpoint (each rotational position) employed by such a rotating imaging system (for capturing the 2D images at different angles of view), intrinsic parameters of the rotating system may be computed, *see e.g.*, col. 9, lines 62-68. While *Picard* describes various techniques that may be employed for calibrating an imaging device for capturing 2D image information that can then be processed for reconstructing 3D information therefrom, *Picard* does not address any specific reconstruction techniques that may be employed for performing such reconstruction of 3D information from the captured 2D images, and *Picard* certainly does not teach using an iterative technique for reconstructing the 3D images from the 2D images. Again, *Picard*’s iterative technique described in col. 9 thereof is directed solely to calibrating the X-ray imaging device for capturing the 2D images.

In response to the above arguments, the Final Office Action asserts that *Picard* discloses use of the iterative conjugate gradient algorithm for performing 3D reconstruction, citing to various portions of column 9 of *Picard*, *see* item 1 on page 2 of the Final Office Action.

However, as discussed above, column 9 of *Picard* merely discusses use of the conjugate gradient algorithm for determining calibration parameters for an imaging device, and does not provide any teaching whatsoever of using such conjugate gradient algorithm in reconstructing 3D images from captured 2D images. As mentioned above, while the imaging system of *Picard* may capture 2D images that can then be processed for reconstructing 3D images, the use of the conjugate gradient algorithm discussed at column 9 of *Picard* is solely described as being used in calibrating the imaging device for capturing the 2D images and is not described as being used in any manner whatsoever in performing a 3D reconstruction.

In item 2 of the Final Office Action (page 2 thereof), the Examiner further alleges that *Picard* describes 3D reconstruction from captured 2D images, citing to col. 3, lines 8-11, col. 9, lines 50-60, and col. 10, lines 40-44. However, the cited portions of *Picard* merely mentions that once the 2D images are captured by the properly calibrated imaging device, those images may then be processed for performing 3D reconstruction. For instance, col. 3, lines 8-11 provides “The present invention therefore proposes a device enabling an automatic calibration that can be applied to any system of 2D X-ray imaging and in particular to any system used for purposes of 3D reconstruction.” As such, *Picard* expressly explains that its calibration is of the 2D X-ray imaging system, and while *Picard* recognizes that the 2D images captured by the 2D X-ray imaging system may be processed for reconstructing 3D images, *Picard* does not teach employing an iterative technique for performing such 3D reconstruction.

Accordingly, *Picard* proposes employing an iterative conjugate gradient algorithm for determining calibration parameters for a 2D X-ray imaging system. Once calibrated, the 2D X-ray imaging system may be employed to capture 2D images, which may then be processed in some way to reconstruct 3D images. However, *Picard* does not describe any specific technique for performing the 3D reconstruction, and certainly fails to teach “iteratively processing the received 2D images to reconstruct 3D image data therefrom” as recited by claim 1.

In view of the above, *Picard* fails to teach iteratively processing received 2D images to reconstruct 3D image data therefrom, as recited by claim 1. Therefore, *Picard* fails to anticipate claim 1, and the rejection of record should be overturned.

Also, dependent claims 2-3 and 13-14 depend either directly or indirectly from claim 1, thus inheriting all of the limitations of independent claim 1. These claims are believed to be allowable over *Picard* for at least the reasons presented above for claim 1. Therefore, Appellant respectfully requests that the Board overturn the rejection of claims 2-3 and 13-14.

Dependent Claim 4

Dependent claim 4 depends from claim 1, and thus inherits all of the limitations of claim 1 in addition to its own supplied limitations. It is respectfully submitted that dependent claim 4 is allowable at least because of its dependence from claim 1 for the reasons discussed above.

Claim 4 further recites “wherein the 2D images are not required to be received in a pre-defined order.” *Picard* fails to teach that the 2D images are not required to be received in a pre-defined order in order to process them for reconstructing 3D image data therefrom. Indeed, as discussed above with claim 1, *Picard* does not address any specific techniques for processing of received 2D images to reconstruct 3D image data, and fails to teach such a technique that does not require the 2D images to be received in a pre-defined order.

Further, as the present application explains at paragraphs 0043-0053, traditional 3D tomographic reconstruction techniques employed for reconstructing 3D image data from 2D images have employed mathematical techniques, such as a Filtered Back Projection (FBP) method, which require adherence to a predefined, rigid order of acquiring the 2D image data. Thus, because *Picard* does not describe its 3D reconstruction technique in detail (but instead focuses primarily on its application of the conjugate gradient algorithm for calibrating the 2D X-ray imaging system), the 3D reconstruction technique that may be employed in *Picard* for processing the 2D images captured by its 2D X-ray imaging system to reconstruct 3D image data therefrom would likely have been understood to be such a traditional method that requires adherence to a predefined, rigid order of acquiring the 2D image data.

Therefore, the rejection of dependent claim 4 should be overturned for this further reason.

Dependent Claim 5

Dependent claim 5 depends from claim 4, which depends from claim 1, and thus claim 5 inherits all of the limitations of claims 1 and 4 in addition to its own supplied limitations. It is respectfully submitted that dependent claim 5 is allowable at least because of its dependence from claims 1 and 4 for the reasons discussed above.

Claim 5 further recites “wherein said iteratively processing comprises: processing said 2D images as they are received.” As discussed above with claim 1, *Picard* does not address any specific techniques for processing received 2D images to reconstruct 3D image data, and fails to teach such a technique that does not require the 2D images to be received in a pre-defined order (per claim 4) and which processes the 2D images as they are received (per claim 5).

Therefore, the rejection of dependent claim 5 should be overturned for this further reason.

Dependent Claim 6

Dependent claim 6 depends from claim 4, which depends from claim 1, and thus claim 6 inherits all of the limitations of claims 1 and 4 in addition to its own supplied limitations. It is respectfully submitted that dependent claim 6 is allowable at least because of its dependence from claims 1 and 4 for the reasons discussed above.

Claim 6 further recites “wherein said iteratively processing comprises: processing 2D images in the order in which they are received.” As discussed above with claim 1, *Picard* does not address any specific techniques for processing received 2D images to reconstruct 3D image data, and fails to teach such a technique that does not require the 2D images to be received in a pre-defined order (per claim 4) and which processes the 2D images in the order in which they are received (per claim 6).

Therefore, the rejection of dependent claim 6 should be overturned for this further reason.

Independent Claim 15 and Dependent Claim 16

Independent claim 15 recites:

A system for processing 2D image data for reconstructing 3D image data therefrom, the system comprising:

means for receiving a plurality of 2D images acquired at different angles of view; and

means for iteratively processing the received 2D images to reconstruct 3D image data therefrom. (Emphasis added).

Picard fails to teach means for iteratively processing received 2D images to reconstruct 3D image data therefrom. Instead, as discussed above with claim 1, *Picard* is directed to calibrating an X-ray imaging device, in which *Picard* appears to teach iteratively processing 2D images to automatically determine parameters or calibration coefficients of the X-ray imaging device. Therefore, *Picard* fails to anticipate claim 15, and the rejection of record should be overturned.

Also, dependent claim 16 depends from claim 15, thus inheriting all of the limitations of independent claim 1. Claim 16 is believed to be allowable over *Picard* for at least the reasons presented above for claim 15. Therefore, Appellant respectfully requests that the Board likewise overturn the rejection of claim 16.

Dependent Claim 17

Dependent claim 17 depends from claim 15, and thus inherits all of the limitations of claim 15 in addition to its own supplied limitations. It is respectfully submitted that dependent claim 17 is allowable at least because of its dependence from claim 15 for the reasons discussed above.

Claim 17 further recites “wherein said means for iteratively processing does not require that the received 2D images be received in a pre-defined order.” As discussed above with claim 15, *Picard* does not provide any such means for iteratively processing 2D images to reconstruct

3D image data therefrom, and *Picard* further fails to teach such a means that does not require the 2D images to be received in a pre-defined order (per claim 17).

Further, as the present application explains at paragraphs 0043-0053, traditional 3D tomographic reconstruction techniques employed for reconstructing 3D image data from 2D images have employed mathematical techniques, such as a Filtered Back Projection (FBP) method, which require adherence to a predefined, rigid order of acquiring the 2D image data. Thus, because *Picard* does not describe its 3D reconstruction technique in detail (but instead focuses primarily on its application of the conjugate gradient algorithm for calibrating the 2D X-ray imaging system), the 3D reconstruction technique that may be employed in *Picard* for processing the 2D images captured by its 2D X-ray imaging system to reconstruct 3D image data therefrom would likely have been understood to be such a traditional method that requires adherence to a predefined, rigid order of acquiring the 2D image data.

Therefore, the rejection of dependent claim 17 should be overturned for this further reason.

Independent Claim 18

Independent claim 18 recites:

A system for processing 2D image data for reconstructing 3D image data therefrom, the system comprising:
an imaging system operable to capture a plurality of 2D images at different angles of view; and
a reconstruction processor communicatively coupled to the imaging system, said reconstruction processor operable to receive the plurality of captured 2D images and iteratively process the received 2D images to reconstruct 3D image data therefrom in accordance with a conjugate gradient algorithm.
(Emphasis added).

Picard fails to teach a reconstruction processor that is operable to receive a plurality of captured 2D images and iteratively process the received 2D images to reconstruct 3D image data therefrom in accordance with a conjugate gradient algorithm. Instead, as discussed above with claim 1, *Picard* is directed to calibrating a 2D X-ray imaging device, in which *Picard* appears to

teach iteratively processing 2D images to automatically determine parameters or calibration coefficients of the X-ray imaging device. That is, *Picard* employs a conjugate gradient algorithm for processing 2D images of a calibrating object in order to determine calibration parameters of the X-ray imaging device, not for processing the captured 2D images for reconstructing 3D image data therefrom. Therefore, *Picard* fails to anticipate claim 18, and the rejection of record should be overturned.

Dependent Claim 19

Dependent claim 19 depends from claim 18, and thus inherits all of the limitations of claim 18 in addition to its own supplied limitations. It is respectfully submitted that dependent claim 19 is allowable at least because of its dependence from claim 18 for the reasons discussed above.

Claim 19 further recites “wherein the reconstruction processor does not require the 2D images to be received in a pre-defined order.” As discussed above with claim 18, *Picard* does not provide a reconstruction processor that is iteratively process 2D images to reconstruct 3D image data therefrom in accordance with a conjugate gradient algorithm. Further, *Picard* fails to teach such a reconstruction processor that does not require the 2D images to be received in a pre-defined order (per claim 19).

Further, as the present application explains at paragraphs 0043-0053, traditional 3D tomographic reconstruction techniques employed for reconstructing 3D image data from 2D images have employed mathematical techniques, such as a Filtered Back Projection (FBP) method, which require adherence to a predefined, rigid order of acquiring the 2D image data. Thus, because *Picard* does not describe its 3D reconstruction technique in detail (but instead focuses primarily on its application of the conjugate gradient algorithm for calibrating the 2D X-ray imaging system), the 3D reconstruction technique that may be employed in *Picard* for processing the 2D images captured by its 2D X-ray imaging system to reconstruct 3D image data therefrom would likely have been understood to be such a traditional method that requires adherence to a predefined, rigid order of acquiring the 2D image data.

Therefore, the rejection of dependent claim 19 should be overturned for this further reason.

Dependent Claim 20

Dependent claim 20 depends from claim 18, and thus inherits all of the limitations of claim 18 in addition to its own supplied limitations. It is respectfully submitted that dependent claim 20 is allowable at least because of its dependence from claim 18 for the reasons discussed above.

Claim 20 further recites “wherein the reconstruction processor does not require a pre-defined order of capturing said different angles of view.” As discussed above with claim 18, *Picard* does not provide a reconstruction processor that is iteratively process 2D images to reconstruct 3D image data therefrom in accordance with a conjugate gradient algorithm. Further, *Picard* fails to teach such a reconstruction processor that does not require a pre-defined order of capturing the different angles of view (per claim 20).

Therefore, the rejection of dependent claim 20 should be overturned for this further reason.

II. Rejections Under 35 U.S.C. §103

Claims 7-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over *Picard* in view *Elena*; and claim 12 is rejected under 35 U.S.C. §103(a) as being unpatentable over *Picard* in view of *Elena* and further in view of *Tam*. As shown above, *Picard* does not teach every feature of independent claim 1. Dependent claims 7-10 and 12 each depend either directly or indirectly from independent claim 1 and, thus, inherit all of the limitations of independent claim 1. Neither *Picard* nor *Elena* are relied upon as teaching the above-noted deficiency of *Picard* regarding claim 1, nor do they appear to teach all elements of claim 1. Appellant respectfully submits that dependent claims 7-10 and 12 are therefore allowable based at least on their dependency from claim 1 for the reasons discussed above.

Additionally, the present application addresses the teachings of *Elena*, and explains that *Elena* proposes application of the conjugate gradient for processing captured 1D image data for reconstructing 2D image data therefrom. As the present application explains at paragraphs 0083-0085, it was not apparent to one of ordinary skill in the art whether the conjugate gradient method could be extended for application in 3D image reconstruction. Further, as explained in paragraphs 0107-0108 of the present application, prior to the invention by the present inventors, serious questions existed from *Elena* regarding whether the conjugate gradient method could be practically extended to 3D image reconstruction, including questions concerning convergence of the method, number of required iterations and computation time involved.

Accordingly, as discussed above, *Picard* does not propose use of the conjugate gradient method for reconstructing 3D image data from received 2D images, but instead proposes use of the conjugate gradient method for determining calibration parameters to set for a 2D X-ray imaging system. While the 2D image system, once calibrated, may be used to capture 2D images that may be further processed for reconstructing 3D images therefrom, *Picard* does not address such 3D reconstruction technique and certainly does not propose using the conjugate gradient algorithm in performing the 3D reconstruction. Additionally, *Elena* fails to teach or suggest using the conjugate gradient algorithm for performing 3D reconstruction, but as the present application explains, *Elena* merely proposes its use for 2D reconstruction. As discussed above, the extension of the application of the conjugate gradient algorithm to 3D reconstruction was not at all obvious (and was questionable as to whether it would have been practically possible). As such, the reliance on *Elena* in the Final Office Action is largely misplaced, as it is concerned with 2D reconstruction rather than 3D reconstruction.

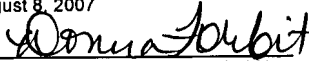
Accordingly, the rejections of claims 7-10 and 12 should likewise be overturned.

III. Conclusion

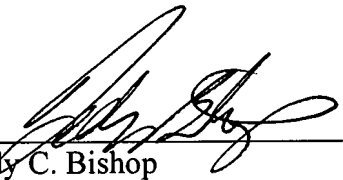
In view of the above, Appellant requests that the board overturn the outstanding rejections of claims 1-10 and 12-20. Attached hereto are a Claims Appendix, Evidence Appendix, and Related Proceedings Appendix. As noted in the attached Evidence Appendix, no evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the Examiner is being submitted. Also, as noted by the Related Proceedings Appendix, no related proceedings are referenced in II above, and thus no copies of decisions in related proceedings are provided.

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the U.S. Postal Service as Express Mail, Airbill No. EV629238138US, on the date shown below in an envelope addressed to: MS Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Dated: August 8, 2007

Signature: 
(Donna Forbit)

Respectfully submitted,

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Date: August 8, 2007
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VIII. Claims Appendix

Claims Involved in the Appeal of Application Serial No. 10/684,000:

1. A method for processing 2D image data for reconstructing 3D image data therefrom, the method comprising:
receiving a plurality of 2D images acquired at different angles of view; and
iteratively processing the received 2D images to reconstruct 3D image data therefrom.
2. The method of claim 1 wherein said 3D image data comprises at least one cross-section of an object under inspection.
3. The method of claim 1 wherein said iteratively processing comprises:
processing the received 2D images in accordance with a conjugate gradient algorithm.
4. The method of claim 1 wherein the 2D images are not required to be received in a pre-defined order.
5. The method of claim 4 wherein said iteratively processing comprises:
processing said 2D images as they are received.
6. The method of claim 4 wherein said iteratively processing comprises:
processing 2D images in the order in which they are received.
7. The method of claim 1 further comprising:
determining an optimal regularization parameter.
8. The method of claim 7 further comprising:
using the determined optimal regularization parameter in said iteratively processing.
9. The method of claim 7 wherein said determining an optimal regularization parameter comprises:
using an L-curve to determine the optimal regularization parameter.

10. The method of claim 1 further comprising:
determining an optimal number of iterations to perform in said iteratively processing.
11. (Canceled)
12. The method of claim 10 wherein said determined optimal number of iterations comprises 5 iterations.
13. The method of claim 1 further comprising:
a radiographic imaging system capturing said plurality of 2D images at said different angles of view for an object under inspection.
14. The method of claim 13 wherein said radiographic imaging system uses cone-beam tomography to capture said plurality of 2D images.
15. A system for processing 2D image data for reconstructing 3D image data therefrom, the system comprising:
means for receiving a plurality of 2D images acquired at different angles of view; and
means for iteratively processing the received 2D images to reconstruct 3D image data therefrom.
16. The system of claim 15 wherein said means for iteratively processing comprises:
means for processing the received 2D images in accordance with a conjugate gradient algorithm.
17. The system of claim 15 wherein said means for iteratively processing does not require that the received 2D images be received in a pre-defined order.
18. A system for processing 2D image data for reconstructing 3D image data therefrom, the system comprising:
an imaging system operable to capture a plurality of 2D images at different angles of view; and

a reconstruction processor communicatively coupled to the imaging system, said reconstruction processor operable to receive the plurality of captured 2D images and iteratively process the received 2D images to reconstruct 3D image data therefrom in accordance with a conjugate gradient algorithm.

19. The system of claim 18 wherein the reconstruction processor does not require the 2D images to be received in a pre-defined order.

20. The system of claim 18 wherein the reconstruction processor does not require a pre-defined order of capturing said different angles of view.

IX. Evidence Appendix

No evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the examiner is being submitted.

X. Related Proceedings Appendix

No related proceedings are referenced in II above, and thus no copies of decisions in related proceedings are provided.